



Developing a Caring Ethic for Middle School Mathematics Classrooms

Angiline Powell & Allen H. Seed

Angiline (first author) remembers her first day teaching middle school mathematics. She recalls feeling academically *prepared*, however, she was not *ready* for what was to come. She remembers being excited and enthusiastic about her first year of teaching, but she was not prepared emotionally for the 130 eighth graders she taught every day. They had so many needs. They wanted her to sign forms to go on field trips and to excuse their absences. They needed pencils, paper, and books. Mostly they wanted her attention, but Angiline had no idea how to meet the emotional needs of these young adolescents.

A colleague gave Angiline a book about how to make the most of her mathematics class time. Out of desperation and exhaustion, she tried some of the suggestions to make the beginning of class a valuable time for her and her students. She began to start classes with a critical thinking exercise. Initially, Angiline did this warm-up activity to help keep the students busy while she managed administrative tasks such as taking roll, returning homework, and attending to announcements on the public address system. But as Angiline got better at designing these starting tasks, her students came to enjoy the challenging exercises, and a caring classroom community began to form.

A call to care

Like Angiline, teachers assigned to entry-level or “low track” math classes are entrusted with the students who need them the most. These students may be academically disengaged and, perhaps, do not see how education, especially mathematics, relates to their lives. Students in these classes have many labels, including at-risk, English language learners (ELL), and urban students. Students of color, especially African Americans and Latinos, are likely to be enrolled in these entry-level classes in higher proportions (Oakes, 1995). Mathematics educators are called to engage and educate every one of their students, including these disenfranchised students. Based on recommendations in the literature and their experiences in the classroom, the authors believe that for every student to be successful, teachers must foster a caring ethic (Ladson-Billings, 2006).

The authors, Angiline and Al, are university teacher educators who share similar experiences building community in middle grades mathematics classrooms. In this article, they describe what a caring ethic looks like in a middle grades mathematics class, and they suggest specific practices drawn from their experiences that teachers can implement to make their classrooms more caring and engaging places.

This article reflects the following *This We Believe* characteristics: Meaningful Learning — Multiple Learning Approaches — Adult Advocate

Caring community of learners

As eighth grade mathematics teachers, the authors began the year building relationships with their students and encouraging communication to establish a caring ethic. In their mathematics classes, a caring community attitude was everything, and, as in any community, communication and relationships were paramount. Following Noddings (2002), an ethic of caring in the classroom has four key components. Teachers must *model* acting as caregivers and people who care for others in the classroom. Teachers and their students must engage in *dialogue* about caring as they seek to arrive at common understandings of the concept. Students must have opportunities to *practice* caring for other members of the classroom community. Finally, teachers must offer *confirmation* of the struggles and accomplishments of their students as they care for one another.

Caldwell and Sholtis (2008) provided further insight into developing an ethic of care in the classroom. They identified five characteristics of student-oriented teachers who care for their students: 1. They treat all students with respect by using their names and model how to show respect for other students and other teachers. 2. Student-oriented teachers encourage positive discourse in the classroom, which they demonstrate by giving constructive written encouragement on assignments and frequent verbal praise (Caldwell, 1999). 3. Student-oriented teachers listen to their students and provide them constructive feedback. 4. They are patient, believing firmly in themselves, their work, and their students' abilities. 5. Student-oriented teachers encourage and inspire student thinking by providing time to think and self-discover and by asking higher-order questions.

Powell-Mikle (2003) studied African American students who were successful in mathematics and found that effective mathematics teachers exhibited a caring ethic characterized by teacher availability, positive classroom discourse, and clear explanations. The study participants wanted their mathematics teachers to be available at various times during the day and to spend time with them outside class. They wanted additional examples to reinforce concepts taught in class, and they frequently wanted teachers to ask leading questions until mathematical concepts became clear. The participants also valued their teachers' effective questioning abilities and the ways they encouraged students to ask questions and gave respectful and patient responses to

these questions. This "give and take" between students and teachers is characteristic of the kind of positive classroom discourse essential to good mathematics teaching (National Council of Teachers of Mathematics, 2000). All the participants valued clear explanations as a characteristic of effective mathematics teachers. For these participants, clear explanation meant working out the problems and sharing the thinking strategies with the students. Clear explanations also meant the mathematics teachers had content knowledge and were able to break the mathematical concepts into logical sequences.

Know your students

To foster caring during his teaching, Al began each year with a mathematical autobiography. Throughout this autobiography assignment, Al asked the students to concentrate on their mathematical experiences. He asked them about their families, their daily routines, and how they felt about mathematics (likes and dislikes). Al also asked them whether they were "good" at mathematics or had any mathematics triumphs or disasters. He included additional questions, which are listed in Figure 1.

Teachers can use a similar autobiographical activity to get to know their students and learn about the lives

Figure 1 Mathematical autobiography

- Tell me about your family; include all to whom you feel close.
- Tell me about your friends.
- Are you "good" at mathematics?
- Tell me about any mathematical triumphs or disasters.
- Do you like or dislike mathematics? Why?
- What do you like about learning mathematics? What do you not like?
- What is your first or strongest memory of learning or doing math?
- Have you ever been embarrassed, humiliated, or especially proud of your mathematic ability?
- Do you like/dislike all areas of mathematics equally? If not, which areas do you like/dislike the most? Why?
- Who or what influenced (either positively or negatively) your feelings about mathematics?
- How do you feel about taking this course?
- How do you think your attitude about mathematics will affect your math learning?

they lead. Do your students work? Should homework assignments be shorter than those for other classes? Are your students from a lower socioeconomic status? Will you have to discretely provide materials to some of your students? Do your students have access to technology at home, or will all work requiring technology have to be done in class? What are their interests? Can you make problem solving relevant to their lives? Are your students rural, urban, or suburban? All of these questions have important implications for the way you teach mathematics and can be learned from the mathematical autobiography. Knowledge gleaned from this activity will help teachers make mathematics relevant to their students' interests and make informed decisions about the assignments they ask students to complete.

The mathematical autobiography also helps get students accustomed to writing in math class, facilitating communication, and integrating curricula. Reluctant writers can use a tape recorder or other audio-visual equipment to "write" their mathematical autobiographies. Teachers should model the activity by writing their own mathematical autobiographies and sharing them with their classes. Sharing a personal story makes teachers more human to their students, strengthens relationships with their students, and supports the development of a caring ethic in mathematics class.

Figure 2 Sample problem 1

	10 yrs	11 yrs	12 yrs
Anne	X	X	O
Liana	O	X	X
Rachael	X	O	X

There are three girls in the Taylor family: Anne, Liana, and Rachel. Their ages are 10, 11, and 12. From the clues below, see if you can discover their ages.

1. Anne is not the youngest.
2. Liana is not the oldest.
3. Rachel is neither the oldest nor the youngest.

Solution: Rachel is 11. She cannot be 10 or 12. Since Liana is not the oldest (Clue 2), she must be 10. Anne, then, must be 12. Therefore, Rachel is 11, Anna is 12, Liana is 10. (We remind our students to write the solution to the problem, even though their solutions are summarized in the completed matrix.)

Create opportunities for success

Teachers should help their students feel successful with mathematics, not just arithmetic or computation, which is typically the extent of the curriculum taught in entry-level classes. Angiline and Al both started their classes with five-minute warm-up activities dealing with non-traditional mathematics concepts. They had the most successes with logic problems and visual acuity problems.

Angiline frequently used her students' names in the warm-up problems to make it interesting and to encourage them to pay attention to details (see Figures 2 and 3). She first introduced the mathematics concept she wanted them to learn or practice, then she gave them a grid to help solve the problem. Once Angiline's students became proficient with the easier problems, she added more complexity by having them figure out, based on the logic problem, whether they needed a 3 X 3 matrix, as in Figure 2, or a 4 X 4 matrix to solve the problem. She also increased the difficulty by assigning logic problems with multiple facts to decipher about each person (Figure 3).

Angiline and Al's students typically succeeded with imagery or visual problems. They noticed that students who thought they did not like mathematics participated, enjoyed,

Figure 3 Sample problem 2

	10 yrs	11 yrs	12 yrs	Lisa	Maria	Mya
Anne	X	X	O	X	X	O
Liana	O	X	X	O	X	X
Rachael	X	O	X	X	O	X
Lisa						
Maria						
Mya						

There are three girls in the Taylor family: Anne, Liana, and Rachel. Their ages are 10, 11, and 12. The girls' middle names are Lisa, Maria, and Mya, but not necessarily in that order. From the clues below, can you figure out their middle names and their ages?

1. Anne is not the youngest.
2. Liana is not the oldest.
3. Rachel is neither the eldest nor the youngest.
4. Liana's middle name does not begin with an "M".
5. The eldest girl's middle name is Mya.

Solution: We know that Liana's middle name is Lisa (clue 5). Since Anne is the eldest (12), her middle name is Mya. Rachel's middle name must be Maria.

Students who thought they did not like mathematics participated, enjoyed, and excelled when working these problems.

and excelled when working these problems. Figure 4 is an example of a visual problem AI used in his classroom.


Mathematics classrooms are sometimes perceived to be sterile, boring places in which students work independently to solve problems and complete worksheets. To the contrary, mathematics teachers should facilitate collaborative, social learning. Implemented properly, such approaches can build camaraderie and help teachers—especially new teachers—better manage student behavior. Teachers should encourage their students to work together on these warm-up problems and support them with positive statements such as, “I like how Chandra and Javier are working together.”

Angiline and AI found that students who typically did not excel in arithmetic excelled in the types of warm-up problems discussed above. Perhaps this is because they do, indeed, learn differently than those proficient in computation. At the culmination of the warm-up activity, they encouraged their students to give oral explanations to extend their learning and to promote communication in their mathematics classrooms. They asked questions such as, “How did you come up with that answer?” or, “Did anybody discover a different way to solve the problem?” They asked their students to demonstrate their answers on the whiteboard, overhead projector, or in small groups.

league for his students. He would open his classroom 40 minutes before school started. Boys *and* girls participated in the league. Most of the students were not honor math students, yet they came to school early, enthusiastic about the math involved in managing a fantasy basketball team.

Another colleague fostered a caring community in his mathematics class by giving positive responses to student answers. Some teachers treat their students like game show contestants, demeaning students by dwelling on their incorrect responses—picture the teacher hitting a buzzer and shouting, “Wrong!” when a student replies incorrectly to an oral question. Instead, he used a variety of non-derisive responses. One method was to point out what question the student did answer or what part of the response was correct. He would also ask students how they came up with answers that were incorrect, and he would sometimes ask another student to assist, when appropriate. As one of his eighth grade students stated, “You never feel stupid in his class.”

Figure 4 Sample problem 3



How many triangles? rectangles? squares?
What is the relationship between these polygons and how do they affect the outcome?

Solution: There are 28 triangles, 5 squares, and 8 rectangles. Three of the rectangles are squares, because all squares are rectangles (but not all rectangles are squares).



Mathematics teachers should encourage students to provide oral explanations to problem solutions as a way to extend learning and build community in their classrooms. photo by Alan Geho

Figure 5 Sources of math warm-up problems

About.com: Secondary Education Mathematics Warm-Ups	http://712educators.about.com/cs/warmups/l/blwarmmath.htm
730 Daily Math Warm-Ups	J. Weston Walch, publisher Hope Martin, author
Daily Warm-Ups—Series	Math Realm http://www.mathrealm.com/Books/Daily_Warm_Ups.php
Critical Thinking Activities in Patterns, Imagery & Logic Grades 4–6; Grades 7–12	Dale Seymour Publications Dale Seymour and Ed Beardslee, authors
Salem-Keizer’s Math Online!	http://www.skonline.org/website/mathonline/mathfun.htm
Pearson Scott Foresman Math Surf Problem of the day	http://www.mathsurf.com/problemofday/
Building Thinking Skills Book 3 Figural Book 3 Verbal	Midwest Publications Howard and Sandra Black, authors

Conclusion

Once Angiline and Al had their students hooked on mathematics, they were constantly reminded that their students were bright and capable. They learned to develop a caring ethic in their mathematics classrooms through the use of warm-up problems, mathematical autobiographies, fantasy sports leagues, and positive responses as well as manipulatives, cooperative learning, and communication. Their students developed mathematical knowledge and skills and, equally important, they grew as confident young adolescent learners.

Extensions

The authors describe classroom-tested strategies for developing a caring ethic in mathematics classrooms. In what ways do teachers in other subject areas create caring classrooms?

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